

Test report:	№ 900620
Report date:	08.10.2026
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Name (trade mark/model/type/article) of the sample:	Modules
Standard(s) establishing requirements and/or test methods, including amendments:	Technical Regulation of the Customs Union TR CU 020/2011 "Electromagnetic compatibility of technical devices"
The test results in this report apply only to the submitted sample. Reproduction or reprinting of the test report without permission of the testing laboratory is not permitted.	

Test conditions:	
Ambient temperature, C	20 ± 5
Relative humidity, %	30 ÷ 80
Atmospheric pressure, kPa	84 ÷ 115

Test results

Results of electrostatic discharge immunity tests GOST CISPR 24-2013

Severity level	Test voltage, kV		Criterion of functional performance of the product	Product operation during testing	Compliance conclusion
	Contact discharge	Air discharge			
2	4	-	A	Normal operation without malfunction	Pass
3	-	8	B, A	Normal operation without malfunction	Pass

Results of immunity tests to electrical fast transients/bursts on circuits GOST CISPR 24-2013

Severity level	Test voltage, kV	Functional performance criterion	Operation of the products during testing	Compliance conclusion
2	±1,0	A	Operation without malfunction	Pass

Results of immunity tests to dynamic supply-voltage variations (interruptions and dips) GOST CISPR 24-2013

Type of dynamic	Severity	Test exposure	Function	Compliance
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supply-voltage variation	level of test	Test voltage, % of Un	Amplitude of dynamic voltage variation in % of Un	Duration of dynamic voltage variation T _{dyn} . (cycles/ms)	performance criterion	Product operation during testing	conclusion
Voltage dips	2	70	30	25/500	A, B	Operation without malfunction	Pass
Voltage interruptions	2	0	100	5/100	A, B	Operation without malfunction	Pass

Results of immunity tests to high-energy microsecond surge disturbances on power supply circuits (line-to-line and line-to-earth) GOST CISPR 24-2013

and line to earth) GOST R 27 2015					
Severity level	Test voltage, kV		Criterion of functional performance of the product	Product operation during testing	Compliance conclusion
	power supply circuits				
	line-to-line	line-to-earth			
2	±1,0	-	B, C	Operation without malfunction	Pass
	-	±2,0	B, C		

Results of product immunity tests to conducted disturbances induced by radio-frequency electromagnetic fields GOST CISPR 24-2013

This report relates only to the sample subjected to testing

Severity level	Frequency range, MHz	Test voltage, V	Functional performance criterion of the product	Operation of the product during testing	Conclusion on compliance
2	0,15 – 80	3	A	Normal operation without malfunction	Pass

EMISSION. GOST 61000-6-4-2016

Industrial radio disturbance (IRD).

Product test results for compliance with limits for conducted industrial radio disturbance voltage at mains terminals in the frequency range from 0.15 MHz to 30 MHz according to GOST 61000-6-4-2016 are given in Table 1.

Test method: GOST 30805.16.2.1-2013

Ports tested: AC mains power port.

Table 1

Frequency of measurement, MHz	Measured values (quasi-peak), QP, dB(uV)		Measured values (average) AV, dB(uV)		Limit values QP, dB(uV)	Limit values AV, dB(uV)	Compliance requirements
	U _{max}	N,L	U _{max}	N,L			
0,2	61,21	L	-	L	79,00	66,00	Pass
0,45	53,73	L	-	L	79,00	66,00	Pass
1,56	54,34	L	-	L	73,00	60,00	Pass
3,37	57,59	L	-	L	73,00	60,00	Pass
3,6	44,37	L	-	L	73,00	60,00	Pass
5,1	56,91	L	-	L	73,00	60,00	Pass
11,29	45,35	L	-	L	73,00	60,00	Pass
14,89	34,79	L	-	L	73,00	60,00	Pass
18,91	56,91	L	-	L	73,00	60,00	Pass
19,85	54,28	L	-	L	73,00	60,00	Pass
25,12	51,49	L	-	L	73,00	60,00	Pass
28,21	53,72	L	-	L	73,00	60,00	Pass

* “N”-mains terminal “neutral”, “L”-mains terminal “line”.

Average radio-disturbance voltage measurements were not performed because quasi-peak values do not exceed the average limits.

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Product test results for compliance with radiated electromagnetic field strength limits in the frequency range 30-1000 MHz according to GOST 61000-6-4-2016 are given in Tables 2 and 3.

Test method: GOST 30805.16.2.3-2013

Ports tested: enclosure port

Table 2 (Horizontal polarization)

Frequency MHz	Measured radiated IRD values (QP) dB(uV/m)	Radiated IRD limit values (QP) dB(uV/m)	Compliance with requirements
53,06	26,71	40	Pass
163,31	27,32	40	Pass
181,49	23,36	40	Pass
278,69	26,35	47	Pass
400,43	28,91	47	Pass
451,27	27,81	47	Pass
487,07	31,84	47	Pass
591,93	32,53	47	Pass
632,56	34,12	47	Pass
750,82	24,49	47	Pass
794,23	29,85	47	Pass
889,10	39,25	47	Pass
941,38	29,80	47	Pass

Table 3 (Vertical polarization)

Frequency MHz	Measured radiated IRD values (QP) dB(uV/m)	Radiated IRD limit values (QP) dB(uV/m)	Compliance with requirements
64,14	24,72	40	Pass
132,20	27,92	40	Pass
252,81	35,08	47	Pass
272,76	28,64	47	Pass
342,10	26,72	47	Pass
470,90	35,92	47	Pass
539,56	28,48	47	Pass
619,15	30,08	47	Pass
635,24	38,43	47	Pass

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769,10	26,40	47	Pass
846,20	32,88	47	Pass
919,63	29,99	47	Pass
948,70	29,79	47	Pass

IMMUNITY. GOST 61000-6-4-2016

Performance criteria for technical devices during immunity testing.

Criterion A - during and after the disturbance is applied, the device shall continue to operate as intended. No degradation of performance below the level specified by the manufacturer for intended use, or loss of function, is permitted.

Criterion B – after termination of the disturbance, the device shall continue to operate as intended. No degradation of performance below the level specified by the manufacturer for intended use, or loss of function, is permitted.

Criterion C - temporary loss of function is permitted provided that the function is self-recovering or can be restored by user control operations.

Immunity to electrostatic discharge.

Product test results for compliance with electrostatic-discharge immunity requirements according to GOST 61000-6-4-2016 with test exposures according to GOST 61000-6-4-2016 direct ESD exposure by contact and air discharge, and indirect ESD exposure by contact discharge, are given in Table 4.

Ports tested: enclosure, control buttons, horizontal and vertical coupling planes.

Table 4

Type of disturbance	Voltage, kV	Number of applications	Required performance	Result of compliance
Contact discharge	4	10 positive 10 negative	B	Pass
Air discharge	8	10 positive 10 negative	B	Pass

Immunity to electrical fast transient/burst disturbances (EFT/B).

Product test results for compliance with EFT/B immunity requirements according to GOST 61000-6-4-2016 with test exposures according to GOST 61000-6-4-2016 are given in Table 5.

Ports tested: AC mains power port.

Table 5

Type of disturbance	Voltage pulse amplitude kV $\pm 10\%$	Required performance	Result of compliance
Electrical fast transient/burst (EFT/B)	$\pm 2,0$	B	Pass

Immunity to conducted disturbances induced by radio-frequency fields in the frequency range from 0.15 to 80 MHz.

Product test results for compliance with immunity requirements to conducted disturbances induced by radio-frequency fields according to GOST 61000-6-4-2016 with test exposures according to STB IEC 61000-4-6-2011 are given in Table 6.

Ports tested: AC mains power port.

This report relates only to the sample subjected to testing

Table 6

Type of disturbance	Frequency range of exposure, MHz	Test voltage level, V (dB/uV)	Required performance	Result of compliance
Conducted disturbances induced by radio-frequency electromagnetic fields. AM 80%, 1 kHz	0,15 - 47, 68 - 80	10(140)	A	Pass
	47 - 68	3(130)	A	Pass

Immunity to radio-frequency electromagnetic field.

Product test results for compliance with RF electromagnetic-field immunity requirements in the frequency range from 80 to 1000 MHz according to GOST 61000-6-4-2016 with test exposures according to GOST 61000-6-4-2016 are given in Table 7.

Port tested: enclosure port

Table 7

Type of disturbance	Frequency range of exposure, MHz	Test field strength, V/m (dB/uV/m)	Required performance	Result of compliance
Radio-frequency electromagnetic field. AM 80%, 1 kHz	80 -1000*	10(140)	A	Pass
	1400 - 2000	3(130)	A	Pass
	2000 - 2700	1(120)	A	Pass

*Excluding broadcast bands 87-108, 174-230 and 470-790 MHz, where the electric-field strength shall be 3 V/m.

Immunity to high-energy microsecond surge disturbances.

Product test results for compliance with high-energy microsecond surge immunity requirements according to GOST 61000-6-4-2016 with test exposures according to STB IEC 61000-4-5-2006 are given in Table 8.

Ports tested: AC mains power port.

Table 8

Type of disturbance	Voltage pulse amplitude kV $\pm 10\%$	Required performance	Result of compliance
Surge, line-to-line	$\pm 1,0$	B	Pass
Surge, line-to-earth	$\pm 2,0$	B	Pass

Immunity to dynamic changes of supply voltage.

Product test results for compliance with supply-voltage variation immunity requirements according to GOST 61000-6-4-2016 with test exposures according to GOST 61000-6-4-2016 are given in Table 9.

Ports tested: AC mains power port.

Table 9

Type of dynamic mains-voltage variation	Test exposure			Required performance	Result of compliance
	Test voltage	Amplitude of dynamic	Duration of dynamic voltage		

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	as % of U_{nom}	voltage variation as % of U_{nom}	variations, cycles		
Voltage dips voltage	0	100	1	B	Pass
	40	60	10	C	Pass
	70	30	25	C	Pass
Interruptions voltage	0	100	250	C	Pass

* Voltage changes at zero crossing.

Immunity to power-frequency magnetic field.

Product test results for compliance with power-frequency magnetic-field immunity requirements according to GOST 61000-6-4-2016 with test exposures according to STB IEC 61000-4-8-2011 are given in Table 10.

Port tested: enclosure port.

Table 10

Type of exposure	Test level	Required performance	Result of compliance
Power-frequency magnetic field (PFMF)	30 A/m, 50 Hz	A	Pass

GOST 61000-6-4-2016

"Electromagnetic compatibility of technical equipment. Immunity to electromagnetic disturbances of equipment used in residential, commercial and light-industrial environments. Requirements and test methods"

Immunity tests:

Immunity to electrostatic discharge

Type of disturbance	Severity level	Voltage, kV	Number of applications	Required performance	Test result
Contact discharge	2	4	10 positive 10 negative	B	A
Air discharge	3	8	10 positive 10 negative	B	A

Immunity to high-energy microsecond surge disturbances.

Type of disturbance	Severity level	Voltage pulse amplitude kV $\pm 10\%$	Required performance	Test result
Microsecond surges, line-to-line	2	$\pm 1,0$	B	A
Microsecond surges, line-to-earth	2	$\pm 2,0$	B	A

Immunity to electrical fast transient/burst disturbances.

Type of disturbance	Severity level	Test exposure amplitude, kV	Pulse repetition frequency, kHz	Required performance	Test result
Burst disturbances, line-to-line	2	2	5	B	A

Immunity to conducted disturbances induced by radio-frequency fields.

Type of disturbance	Severity level	Frequency range of exposure, MHz	Test voltage level, V (dB/uV)	Required performance	Test result
Conducted disturbance induced by RF emission (through coupling/decoupling networks (CDN))	2	From 0.15 to 80	10	A	A

Immunity to dynamic changes of supply voltage.

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Type of dynamic mains-voltage variation	Electromagnetic environment class	Test exposure			Required performance	Test result
		Test voltage, % of U_{nom}	Amplitude of dynamic voltage variation as % of U_{nom}	Duration of dynamic voltage variation, cycles (period)		
Voltage dips	2	0	30	1	B	A
Voltage dips	2	70	30	25	B	A
Voltage interruptions	2	0	100	250	C	B

Immunity to radio-frequency electromagnetic field.

Type of disturbance	Severity level	Frequency range of exposure, MHz	Test field strength, V/m (dB(uV/m))	Required performance	Test result
Radio-frequency electromagnetic field	2	From 80 to 1000	10(80)	A	A

Measurement of industrial radio disturbance (IRD). GOST 61000-6-4-2016

Asymmetric radio-disturbance voltage (range 0.15-30 MHz):

Frequency, MHz	Quasi-peak values		Average values	
	Permissible disturbance level, dB(uV), max.	Disturbance level, dB(uV)	Permissible disturbance level, dB(uV), max.	Disturbance level, dB(uV)
0,15	66,0	44	56,0	37
0,16	65,5	41	55,5	35
0,26	61,1	39	51,1	32
0,38	58,2	35	48,2	30
0,50	56,0	28	46,0	28
1,22	56,0	24	46,0	22
2,54	56,0	21	46,0	19
5,00	56,0	19	46,0	15
7,84	60,0	16	50,0	14
16,33	60,0	14	50,0	12
22,15	60,0	11	50,0	9
30,00	60,0	9	50,0	7

Radio disturbance power.

Frequency, MHz	Quasi-peak values		Average values	
	Permissible disturbance level, dB(pW), max.	Disturbance level, dB(pW)	Permissible disturbance level, dB(pW), max.	Disturbance level, dB(pW)
30,0	45,0	23,5	35,0	14,1
108,5	47,3	22,8	37,3	13,6
198,5	51,1	22,2	41,1	12,8
300,0	55,0	21,6	45,0	12,3
433,0	55,0	20,9	-	-
515,7	55,0	19,2	-	-
1000,0	55,0	18,7	-	-

Complies with requirements (passed tests)	Pass
Requirements (tests) are not applicable to the object under test	N/A

Conclusion:

The samples submitted for testing comply with the requirements of Technical Regulation of the Customs Union TR CU 020/2011 "Electromagnetic compatibility of technical devices"

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